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Issued April 23, 1907.

U. S. DEPARTMENT OF AGRICULTURE.

FOREST SERVICE.

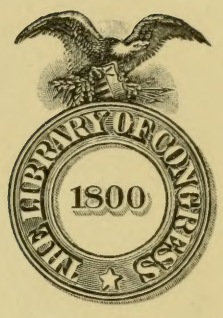
GIFFORD PINCHOT, Forester.

National Forest Order 23.

Part 4.

APRIL, 1907.

Canceling all previous conflicting instructions.



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1.

It has been necessary to return for correction a number of ranger station diagrams already submitted. These were either incomplete in data or bore evident errors which could not be rectified in the Washington office. Such plats could not be relied upon to give the Forest Service valid title to the exact lands desired.

2.

It should be realized by Supervisors that the plats and descriptions which they submit are the data on which the Forest Service bases its recommendations for withdrawal to the Department of the Interior, and unless they are correct and complete in every detail

the withdrawal may not be held legal. It is therefore absolutely necessary that the ranger stations be surveyed with the greatest care, and that the boundaries of the stations on unsurveyed lands be marked by permanent monuments which will serve to hold the tract in case the description is inaccurate.

3.

Since it will be impossible to employ expert surveyors to survey these stations, the following instructions have been prepared and should be rigidly followed. The work should of course be done by those officers who are most experienced in surveying work.

4.

When the lands are surveyed and Government Corners can be located, the plat only need be submitted, showing the subdivisions desired. No description is necessary. (See sample plat, Fig. 1, at back of this Order.)

The determination of the correct subdivisions must not be left to conjecture. The Land Office corners should be located and the necessary lines carefully run in every case when there is the least doubt as to what forties or tens should be recommended for withdrawal. Do not hesitate to recommend enough subdivisions to control completely the land desired.

Where lots occur their numbers should be obtained and shown on the plat.

5.

When the lands are unsurveyed or the Corners of the Government survey can not be located, the

actual boundaries will be marked, and a written description of them submitted with the plat (see second sample plat), in accordance with the following instructions:

6.

FIELD WORK.

Three kinds of permanent marks will be established; *Forest Service Monuments*, to which the ranger station surveys, and possibly future timber surveys, will be tied by bearing and distance; *Corners*, which will be set up at each angle in the ranger station surveys; and *Witnesses*, to which, whenever possible, each monument and corner will be tied.

7.

Forest Service Monuments.—These marks will be used in a similar manner to the mineral monument of a mining district. They should be selected with a view to durability and should be so located as to be certainly found by the description, bearings, and distances. A large distinctive bowlder is good. Where bowlders are too plentiful or entirely absent, a built-up stone monument will serve the purpose better. If a suitable bowlder, or point on a cliff, can not be found or a monument built up, use a prominent tree of long-lived species, or, when trees are absent, resort to a wooden post such as is described under *Corners*.

Chisel (or carve) on the Monument the letters F S M. If the Monument is a tree, cut the letters in a blaze below stump height, and make a second blaze breasthigh for convenience in sighting. If a bowlder,

chisel F S M on a prominent place on the rock, as a definite point to chain from.

8.

Witnessing Monuments.—Select a site for the Monument where it can be easily found, and where distinctive permanent objects, such as the forks of a stream, road, or trail, or their crossings, a good-sized waterfall, a spring, a prominent rock, or the given corner of a house can be used to locate it by bearing and distance. At least two cross bearings from definite witness marks must be taken to properly locate the Monument. The nearer the bearings are at right angles to each other the better. If possible, bearings should also be taken to any prominent topographical features, such as mountain peaks, which should be carefully described if not well known by name.

Chisel on the Witness rocks the letters $\frac{M}{W}$. If the Witness is a tree, carve the $\frac{M}{W}$ in a blaze below stump height and make another blaze breasthigh for convenience in sighting.

Preserve careful descriptions of the Monument, its site, the witnesses, their bearings and distances from the Monument, and the marks placed upon both Monument and witnesses for use in the Description of Survey mentioned later. Consider that someone will probably have to find the Monument sometime from your description alone, and make the description explicit for this purpose.

9.

Corners.—At each point where an angle is turned in surveying the boundary of a ranger station there will be erected a durable, well-constructed Corner similar to those of the Land Office Surveys.

There will be two kinds of Corners, as follows:

When stone can be procured, an oblong block of stone 4 to 10 inches diameter and not less than 2 feet long. This should be sunk at least 1 foot, standing on end, and have a mound of stones heaped up around it.

When stone is not easily obtainable, a wooden post not less than 4 inches square, set not less than 2 feet into the ground and projecting not less than 3 feet. Small stones and earth will be piled up around it so that not more than 1 foot of it is left exposed.

Use for all posts only the most durable woods of the region. In the order of ordinary western woods these would be juniper (commonly called "cedar"), western red cedar, red fir, and western yellow pine. Do not use green timber in any case. Obtain the seasoned heartwood of fire-killed timber wherever possible by hewing the post out of a stick about 8 inches diameter. When pine is used a pitchy heart is preferable. Set the end into the ground which was upward in the tree.

10.

Marking corners.—Each corner post or stone will be marked near the top with the letter R and below this the number of the angle (surveyor's station) at which the Corner is set, beginning with the initial point as 1, and counting on in regular sequence around the plat

in the direction the survey was made. The marking of the monument at the third station would thus be $\frac{R}{3}$. The markings will be chiseled distinctly into the stone posts. On the wooden posts the marking should be cut in deeply with a scribe.

11.

Witnessing corners.—At least two witness marks will be made near each Corner, in order to reestablish the Corner by bearing and distance in case it is destroyed or disputed. Trees should be used when available.

These marks will consist of the letter W and the number of the Corner below, thus $\frac{W}{3}$. They will be chiseled on stone, or carved into a blaze below stump height. A second blaze should be made breast-high, so as to be easily seen above the grass.

12.

It will sometimes be possible to use the Monument as the initial point of the survey. In this case it should bear both Monument and Corner markings, and the Witnesses bear the letters $\frac{M}{W}$ with figure 1 beneath, thus: $\frac{M}{W}$.
1

13.

The surveyor must depend largely on his own common sense and ingenuity in selecting trees or prominent rocks in the proper positions to be serviceable, on

which to place the witness marks. Frequently the stations can be so arranged as to be conveniently near good witnesses without diminishing the value of the tract. Usually the witnesses should not be more than 50 yards from a Corner, and the nearer the better.

14.

The witness marks should be inside the boundary whenever possible. They should be so located as to form as near a right angle as possible, with the Corner at the angle. The specified corner of a building which is not liable to be removed makes a good witness. The Corner and witnesses having been established, the bearing and distance from the Corner to each witness should be taken and recorded with the survey notes of the boundary as a part of the description. The description of each corner and witness and their markings will of course be required.

15.

Blazing the boundary.—Where the boundary of the ranger station passes through timber the line should be plainly blazed. Choose trees over 6 inches in diameter. They need not be nearer to each other than 50 feet in the general direction of the line, and should not be more than 10 feet from the line. Any such tree standing exactly in the line should be blazed fore and aft. Those standing at either side of the line should be blazed on the side toward the line. The blazes should be distinct, not less than the width of the axe blade in cross measure, nor more than 6 inches long, and placed about breastheight on the tree.

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16.

The compass.—Use the best instrument available. It should be nothing less accurate than the regulation 3-inch needle surveyor's compass, used with Jacob staff or tripod.

17.

Variation.—Obtain your variation from reliable local surveyors or from the local land office.

Both on the plat and in the description of the survey statement should be made of the variation used and how or from what source the number of degrees was obtained.

See that your compass is not out of adjustment. The needle should swing freely and quickly, and should settle at the same point on the graduated ring every time, after being disturbed by a knife or other iron held near it.

18.

Test the alignment of the compass sights, as follows: Drive two stakes on a level, open place, about 40 yards apart, and set up the compass midway between them. Level, and sight upon one of the stakes. Then, looking back through the sights, have an assistant move the other stake until it is exactly in line.

Next, taking care not to jar the Jacob staff from its position, loosen the clamp screw, turn the compass around half a circle, and sight upon the second stake. If the compass is in adjustment and operation has been carefully performed, the first stake should also now be seen in line with the sights.

An instrument which will not stand this test successfully upon careful and repeated trials, or which has a weak needle, should be returned to Washington, with a letter placed in the box explaining its defects, and a new compass will be sent to replace it.

19.

Handling the compass.—Set the compass over the Monument or in the line. The Jacob staff can be thrust down alongside the corner in line with the corner sighted to. Level carefully, paying special attention to the cross level. Always sight with the north sight of the compass forward. Never read a bearing from the south end of the needle. Do not attempt to sight more than 200 yards with the ordinary sight compass.

In reading the bearing first put down N. or S., according as the north end of the needle is nearer N. or S. of the compass circle; second, write the number of degrees between the north end of the needle and the nearest zero mark (N. or S.); and, third, write E. or W., according as the needle is nearer E. or W. of the compass circle. The bearing always begins with N. or S., never with E. or W., except when the bearing is true east or west. Thus, a certain bearing should read N. 45° W., not W. 45° N., and N. 30° W. should not be written W. 60° N., although the same direction is indicated after a fashion. Keep all iron, such as the chain, guns, etc., away from the compass while reading the bearing.

20.

Checks.—Two readings of the compass should be taken at every surveyor's station. When a bearing has been read the first time, turn the compass to set the needle swinging, level and sight a second time, and repeat the reading. If the two readings vary more than half a degree, take a third reading. If the third does not agree with one of the others, take the average of the three as the true bearing.

Upon arriving at a station sight back at the station just vacated as a check upon previous error or possible local attraction. The reverse sight should read the same as the fore sight, except that the letters are reversed (i. e., S. 45° E. where the original bearing was N. 45° W.).

Should an opposite corner be visible across the tract from any station, take its bearing. This not only is an excellent check on the survey, but often is of aid when the survey closes badly in platting.

21.

To avoid certain annoyances.—If the needle sticks to the glass, touch a wet finger to the glass.

If at any station the needle is deflected or refuses to settle, showing local attraction from iron—

(1) Offset a chain or more at right angles to the desired bearing, and sight on a flag which is offset an equal distance, on the same side, at the other end of the line. If an offset on one side does not give relief from the local attraction, try the other side.

(2) If the course runs through thick timber, which would necessitate swamping both the true line and

the offset line, move the instrument forward or back to a point on the line of the course and take the bearing. This may give relief from the local attraction.

(3) Rely upon a careful and repeated reverse sight from the next station.

22.

Chaining.—Distances should be given in chains and links; hence the surveyor's chain, 66 feet long and containing 100 links, will be used when possible. Otherwise distances may be taken with the steel or linen tape and given in feet.

In chaining, offset around any very serious obstacle. On steep slopes the true distance can be obtained only by keeping the chain horizontal. To do this use 50 links or less at a time.

23.

PLATTING.

Plats must be submitted only on the tracing linen, Form 878, as extra copies must be made by the blueprint process.

Use only Higgins's black waterproof ink. This ink can be obtained on requisition or purchased in the field.

Plat with a sharp pencil first and ink the lines afterwards.

24.

All necessary data for location of the area should appear on the plat. These consist of the township, range, and section (the latter approximate where unsurveyed), the boundary of the desired tract, with bearings and distances (unless the area conforms to General Land Office subdivisions), the Monument, with its

tie-line to the tract, and the local *name by which the ranger station will be known.*

25.

Do not complicate the plat with unnecessary lines or lettering. *The desired boundary should be heavy enough to distinguish it above all other lines.*

Make necessary lettering very distinct. Place bearings outside the boundary and do not invert them. They should be capable of being read without turning the plat around.

26.

If the plat does not close, throw the error into the sides or angles which are most liable to be inaccurate on account of difficulties in the field work. If local attraction was encountered at one corner the error is likely to be in that angle. If offsets were made, or very rough, steep country traversed on one side, the mistake is probably in the chaining of that side. An error of one link to the chain is allowable. If a larger error appears in platting, the field work *must* be repeated.

27.

Scale.—Show on the plat the scale used. Be sure to use the same scale throughout the plat.

For areas which exceed a mile in length use a scale of 4 inches to the mile; for smaller tracts use 8 inches per mile. For compact areas less than 40 acres use 16 inches per mile.

28.

Description. (On unsurveyed lands only).—With the diagram of each survey should be submitted a

typewritten description of the survey, of which the following is a sample:

DESCRIPTION OF SURVEY.

Wild Cat Ranger Station.

AQUARIUS NATIONAL FOREST, UTAH.

June 15, 1907.

Township 25 north, range 8 east, meridian S. L., section —.

Number ——. List ——. Area, 33¼ acres.

Variation.—This survey was run and platted on variation of 11° 30′ E., obtained by retracement of east line of section 36, township 24 north, range 7 east. Salt Lake land office recommends using 11° to 11° 40′.

Forest Service Monument.—Consists of a bowlder 7′×6′×3′ above ground, situated on the east bank of Wildcat Creek, 7 chains down the stream from the junction of the North and East forks, 70 links from the water's edge, at right angles to the stream. F S M cut on the highest point of the rock as chaining point, whence a yellow pine tree 16 inches diameter bears N. 16° E., 73 links, marked $\frac{M}{W}$ in blaze. Lyon Mountain bears S. 31° 30′ W. Tiger Mountain N. 28° 30′ W. $\frac{M}{W}$ cut on ledge bears S. 54° W.

Beginning at Corner No. 1, a limestone 30″×9″×5″ set in mound of stones and chiseled $\frac{R}{1}$; whence Forest Service Monument above described bears S. 13° W. 2.52 chains. The SW. corner of the ranger's cabin built in 1905 bears N. 18° E. 1.80 chains. A yellow pine 12 inches diameter, blazed and marked $\frac{W}{1}$ bears east 3.03 chains.

Thence N. 58° E.

Chains.

27.80 Leaning scrubby pinyon tree 16 inches diameter.

25 to 35 Line blazed through scattering juniper and pinyon to

35 *Corner No. 2*, a juniper post 5′×4″×4″ in mound of gravel and earth, marked $\frac{R}{2}$, whence a pinyon tree 8 inches diameter, marked $\frac{W}{2}$, bears north 10 links. $\frac{W}{2}$ on a granite bowl-

der 4 feet in diameter and 3 feet above ground, chiseled $\frac{W}{2}$, bears S. 82° E. 2.23 chains.

Thence N. 15° W.

Chains.

10.00 to *Corner No. 3.* A limestone 3″ by 7″ by 26″ in mound of stones, chiseled $\frac{R}{3}$, whence chimney of Ranger Cabin bears S. 46° 30′ W. No other suitable witness objects within 70 yards.

Thence S. 58° W.

28.53 Cross East Fork of Wildcat Creek, course S. 18° W.

28–34 through open yellow pine timber.

34.27 to *Corner No. 4.* A stake of fat pine heartwood in mound of earth, marked $\frac{R}{4}$, whence a yellow pine 2 feet in diameter blazed low and marked $\frac{W}{4}$, bears N. 14° E., 18 links. A red fir 12 inches diameter standing on west bank of east fork of Wildcat Creek, marked $\frac{W}{4}$, bears S. 42½° E. 6.34 chains.

Thence S. 15° E.

Through open pine timber.

2.96 Pine tree 2½ feet in diameter.

7.24 Cross East Fork of Wildcat Creek, course S., 23° E.,

15.00 to *Corner No. 1*, the place of beginning, containing 33.25 acres of land, *be the same more or less*,[a] one-half good agricultural land and balance suitable for pasture only.

JOHN R. HENRY,
Surveyor, Deputy Ranger.

Description and plat compared and approved by
GEORGE H. BARNEY,
Forest Supervisor.

29.

Six carbons will be made, of which five, with the original, are to be forwarded to the Forester, with the plat, and the other one retained by the Supervisor.

[a] This phrase should always be inserted, for legal reasons.

30.

Numbering surveys.—The original copy will be retained in the Washington office. Four of the five carbons forwarded go to the General Land Office with blueprints taken from the plat. The remaining carbon will be marked with its proper number in the order of accepted surveys for that Forest and returned to the Supervisor with a blueprint of the plat.

31.

Supervisors will be responsible for comparing all notes with the plats before forwarding. They should agree accurately, and the plats should be clean and neatly drawn.

32.

SUPPLIES.

The necessary chisels will be furnished by the supervisors and charged to equipment. The scribes will be requisitioned from the Washington office. India ink may be either requisitioned or bought in the local market.

33.

CORRECTING PREVIOUS INACCURACIES.

Upon receipt of this order each Supervisor will submit a list of all the ranger station surveys previously sent in, showing for each survey the variation, if any, on which it was run.

If the lines were run without variation this fact should be stated, and the local variation, as nearly as can be ascertained from any source, should be reported, in order that the proper notation may be made upon the plats.

34.

All plats and descriptions hitherto received which could possibly be accepted as sufficiently definite have been accepted for withdrawal. Therefore all recommendations for Ranger Stations sent to the Washington office before April 15, 1907, for which no notification of withdrawal has been received by officers in charge prior to June 1, 1907, should be considered as rejected and resubmitted as promptly as possible in accordance with this Order.

35.

In all cases in which the original descriptions were not sufficiently definite to enable the tract to be readily relocated, or in which more land than is needed has been either recommended or withdrawn, new descriptions should be submitted as soon as possible definitely locating the precise tracts needed.

GIFFORD PINCHOT,
Forester.

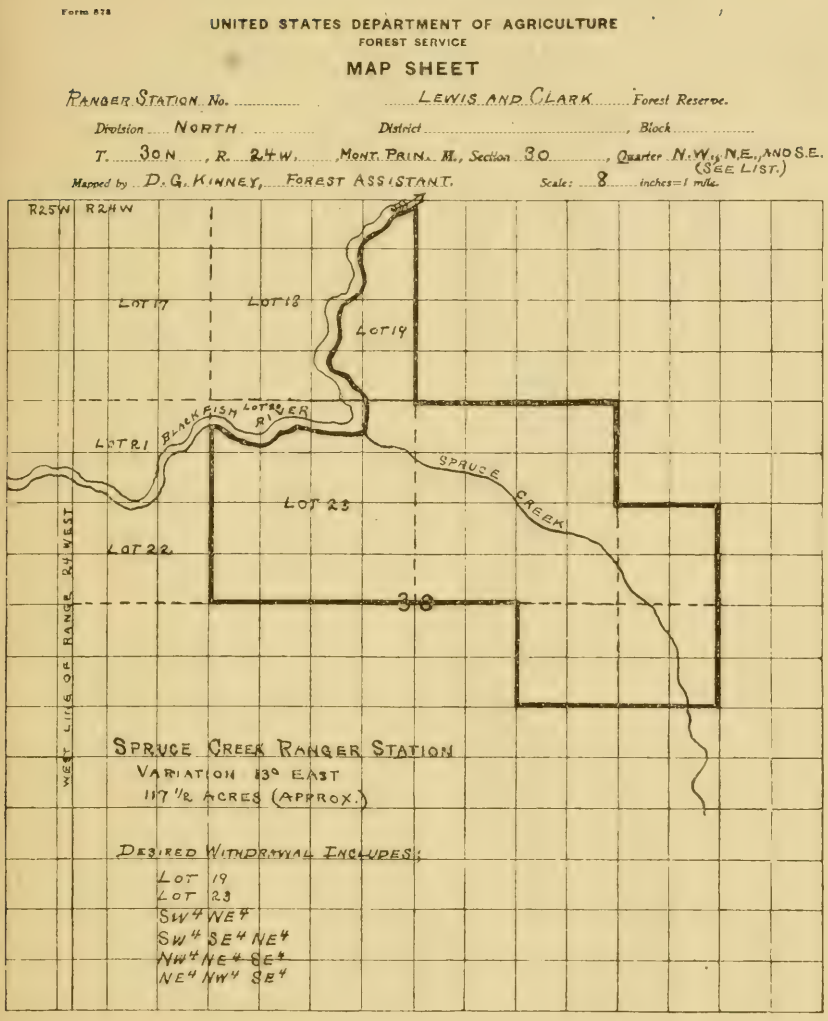

FIG. 1.—Sample plat for surveyed lands where Government corners can be located.

Form 878

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

MAP SHEET

Ranger Station No. ..... Cascade ..... Forest Reserve.

Division North District , Block

T. 4 S., R. 8 E. Willamette M., Section 10 ?, Quarter Unsurveyed

Mapped by R. S. Shelley, Asst. For. Ranger Scale: 8 inches=1 mile.

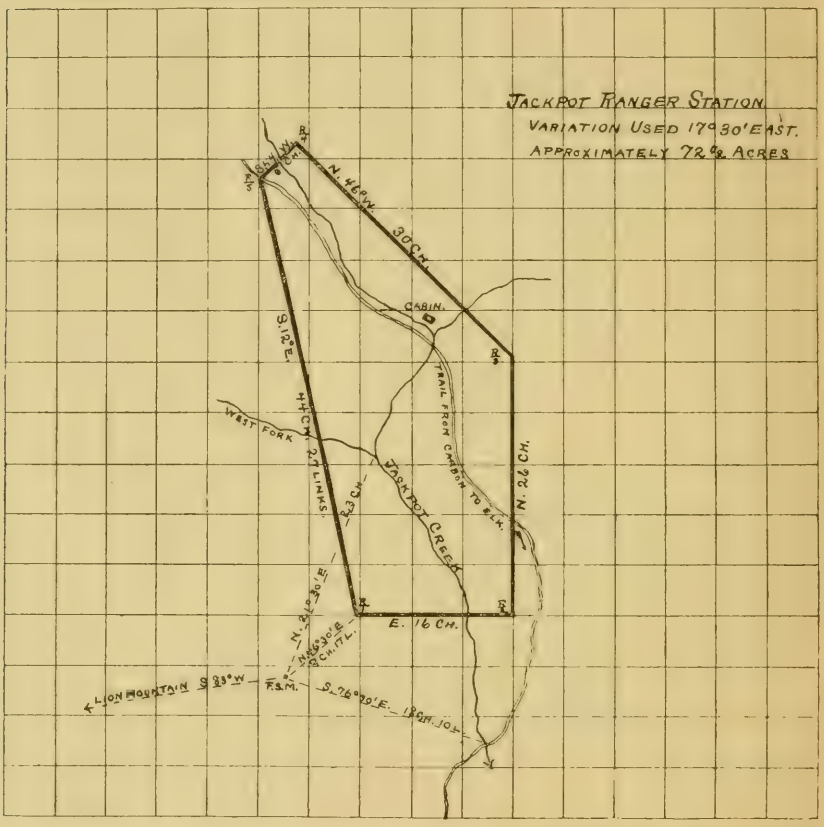

FIG. 2.—Sample plat for unsurveyed lands or for surveyed lands where corners of Government survey can not be located.

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